WHAT IS CLAIMED IS:

1. A method for modifying the values of select ones of a plurality of inputs to a plant, comprised of steps of:

receiving the plurality of inputs;

mapping in a first step of mapping N select ones of the received inputs through a first relationship defining P intermediate inputs numbering less than N, wherein the first relationship defines the relationship between the N select received inputs and the P intermediate inputs as a set of P intermediate values;

processing the P intermediate values through a modifying process which modifies the P intermediate values in accordance with a predetermined modification algorithm to provide P modified intermediate inputs with corresponding P modified intermediate values; and

mapping in a second step of mapping the P modified intermediate inputs and associated P modified intermediate values through the inverse of the first relationship to provide N modified select input values at the output of the second mapping step corresponding to the N select received input values.

2. The method of Claim 1, and further comprising the step of post processing select ones of the N modified select input values on the N modified select inputs with a predetermined process algorithm.

3. The method of Claim 2, wherein the predetermined process algorithm is unique to the associated one of the N modified select inputs.

4. The method of Claim 2, wherein the predetermined process algorithms provide constraining limits on the range of associated ones of the N modified select inputs.

5. The method of Claim 1, wherein the step of processing the P intermediate inputs through a modifying process comprises the step of processing the P intermediate input values through an optimizer to provide optimized intermediate input values as the P modified intermediate values.

6. The method of Claim 5, wherein the optimizer is a steady state optimizer.

7. The method of Claim 6, wherein the steady state optimizer comprises a neural network which is non-linear.

8. The method of Claim 1, wherein the P intermediate inputs constitute a spatial relationship for a parameter of the plant wherein the first relationship defines the spatial relationship of the P intermediate inputs to the N select received inputs.

9. The method of Claim 1 and further comprising the step of pre-processing select ones of the N select ones of the received inputs through a predetermined pre-process algorithm.

10. The method of Claim 9, wherein the step of pre-processing comprises:

defining constraints for select ones of the N select ones of the received inputs; and

limiting the predetermined modification algorithms such that processing of the P intermediate values will not result in the corresponding ones of the N modified inputs from exceeding the defined constraints.

11. A method for optimization of the operation of a boiler, comprising the steps of:

measuring the inputs and the outputs of the boiler;

mapping a defined plurality of the measured inputs through a predetermined relationship that defines a desired operating parameter of the plant based upon said defined plurality of the measured inputs to intermediate inputs numbering less than the defined plurality of the measured inputs;

processing the intermediate inputs and the inputs not in said defined plurality of the measured inputs through an optimizer to provide optimized intermediate input values for the intermediate inputs and optimized inputs not in the defined plurality of the measured inputs optimized in accordance with a predetermined optimization algorithm;

mapping the optimized intermediate input values through an inverse of the predetermined relationship to provide an optimized defined plurality of inputs corresponding to the defined plurality of the measured inputs; and

applying the optimized defined plurality of inputs and the optimized inputs not in the defined plurality of the measured inputs to the boiler.

12. The method of Claim 11, wherein the boiler has a furnace with a plurality of inlet ports for providing fuel to a desired location in the furnace and arranged at different elevations, such that fuel can selectively be delivered at various of the elevations at different feed rates, and wherein the predetermined relationship comprises:

$$Fe = \frac{(K_1)(R_1) + (K_2)(R_2) + (K_3)(K_4) \ldots\ldots + (K_n)(R_n)}{R_1 + R_2 + R_3 \ldots\ldots + R_n}$$

where: Fe = Calculated Fuel Elevation

$K_1 \ldots K_n$ = Elevation Constant for elevation 1 to n (described hereinbelow)

$R_1 \ldots R_n$ = Coal Feed Rate for elevation 1 to n

such that fuel can be concentrated at a desired location in the furnace with a desired center of mass for the fuel concentration.

13. The method of Claim 11, wherein the boiler has a furnace with a plurality of dampers for providing auxiliary air to the furnace with a geometric center defined therefor and arranged at different elevations, such that air can selectively be delivered at various of the elevations at different rates, and wherein the predetermined relationship comprises:

$$\text{Aux\_air\_center} = \frac{\left(\left(\tfrac{1}{3}\right)(D3) + (D5) + (1)(D7)\right)}{D3 + D5 + D7}$$

wherein D3, D5 and D7 represent damper opening values for three dampers, each value for the damper representing a percent open value therefor, this relationship representing the center of mass for the auxiliary air based on the damper positions and an arbitrary furnace elevation scale wherein in damper D7 is set at the maximum elevation, damper D5 is set at ⅔ of the elevation, and damper D3 is set at ⅓ of the elevation.

14. The method of Claim 11, wherein the boiler has a furnace with a plurality of dampers for providing auxiliary air to the furnace from a windbox with a geometric center defined therefor and arranged at different elevations, such that air can selectively be delivered at various of the elevations at different rates, and wherein the predetermined relationship comprises:

$$\text{Aux\_air\_center} = \frac{a}{b}$$

where D3, D5 and D7 represent damper opening values for three dampers, each value for the damper representing a percent open value therefor, this relationship representing the flowated geometric center of for the auxiliary air and:

$$\begin{aligned} a = &(\tfrac{1}{3})(D3)(D3\_Area)(\sqrt{WB/FUR}) \\ &+ (\tfrac{2}{3})(D5)(D5\_Area)(\sqrt{WB/FUR}) \\ &+ (1)(D7)(D7\_Area)(\sqrt{WB/FUR}) \end{aligned}$$

$$\begin{aligned} b = &(D3)(D3\_Area)(\sqrt{WB/FUR}) \\ &+ (D5)(D5\_Area)(\sqrt{WB/FUR}) \\ &+ (D7)(D7\_Area)(\sqrt{WB/FUR}) \end{aligned}$$

D3 = % open of Damper 3

D5 = % open of Damper 5

D7 = % open of Damper 7

WB/FUR = Windbox to Furnace pressure - differential pressure between the windbox and the interior of the furnace.

15. A method for optimizing the operation of a plant having a plurality of manipulatable input variables (MVs) and at least one output, comprising the steps of:

providing a predictive network to receive select ones of the MVs and predict new and updated values therefor as updated MV inputs to the plant in accordance with a predetermined prediction algorithm; and

inputting the updated MV inputs to the plant;

the step of providing a predictive network, comprising the steps of:

mapping in a first step of mapping N select ones of the MVs through a first relationship defining P intermediate MVs numbering less than N, wherein the first relationship defines the relationship between the N select MVs and the P intermediate MVs as a set of P intermediate values,

processing the P intermediate values and the non mapped ones of the MVs through a modifying process which modifies the P intermediate values and the non mapped ones of the MVs in accordance with a predetermined modification algorithm to provide P modified intermediate MVs with corresponding P modified intermediate values and non mapped modified MVs for the non mapped ones of the MVs, and

mapping in a second step of mapping the P modified intermediate MVs and associated P modified intermediate values through the inverse of the first relationship to provide N modified select MVs at the output of the second mapping step corresponding to the N select MVs,

wherein the P modified intermediate MVs and the non mapped modified MVs comprise the updated MV inputs.

16. The method of Claim 15, and further comprising the step of post processing select ones of the N modified MVs on the N modified MVs with a predetermined process algorithm.

17. The method of Claim 16, wherein the predetermined process algorithm is unique to the associated one of the N modified MVs.

18. The method of Claim 16, wherein the predetermined process algorithms provide constraining limits on the range of associated ones of the N modified select inputs.

19. The method of Claim 15, wherein the step of processing the P intermediate MVs and the non mapped MVs through a modifying process comprises the step of processing the P intermediate input values and the non mapped MVs through an optimizer to provide optimized intermediate MVs as the P modified intermediate values and optimized non mapped Mvs for the non mapped MVs.

20. The method of Claim 19, wherein the optimizer is a steady state optimizer.

21. The method of Claim 20, wherein the steady state optimizer comprises a neural network which is non-linear.

22. The method of Claim 15, wherein the P intermediate MVs constitute a spatial relationship for a parameter of the plant wherein the first relationship defines the spatial relationship of the P intermediate MVs to the N select MVs.

23. The method of Claim 15 and further comprising the step of pre-processing select ones of the N select ones of the MVs through a predetermined pre-process algorithm.

24. The method of Claim 23, wherein the step of pre-processing comprises:

defining constraints for select ones of the N select ones of the MVs; and

limiting the predetermined modification algorithms such that processing of the P intermediate values will not result in the corresponding ones of the N modified MVs from exceeding the defined constraints.

25. The method of Claim 15, wherein there are unmeasurable disturbances associated with the plant and the modifying process is based on a model of the plant, and further comprising the step of determining an estimation of the unmeasurable disturbances and altering the modifying process based upon such estimation to account for the unmeasurable disturbances.

26. The method of Claim 25, wherein the step of processing the P intermediate MVs and the non mapped MVs through a modifying process comprises the step of processing the P intermediate input values and the non mapped MVs through a steady state optimizer to provide optimized intermediate MVs as the P modified intermediate values and optimized non mapped Mvs for the non mapped Mvs and the step of determining and altering operable to determine a bias value for the steady state optimizer and apply it to the steady state optimizer.

27. A mapping network for modifying the values of select ones of a plurality of inputs to a plant, comprising:

an input layer for receiving the plurality of inputs;

an input mapper for mapping N select ones of said received inputs through a first relationship defining P intermediate inputs numbering less than N, wherein said first relationship defines the relationship between said N select received inputs and said P intermediate inputs as a set of P intermediate values;

a processor for processing said P intermediate values through a modifying process which modifies said P intermediate values in accordance with a predetermined modification algorithm to provide P modified intermediate inputs with corresponding P modified intermediate values; and

an output mapper for mapping said P modified intermediate inputs and associated P modified intermediate values through the inverse of said first relationship to provide N modified select input values at the output of said output mapper corresponding to said N select received input values.

28. The mapping network of Claim 27, and further comprising a post processor for processing select ones of said N modified select input values on said N modified select inputs with a predetermined process algorithm.

29. The mapping network of Claim 28, wherein the predetermined process algorithm is unique to the associated one of said N modified select inputs.

30. The mapping network of Claim 28, wherein the predetermined process algorithm provide constraining limits on the range of associated ones of said N modified select inputs.

31. The mapping network of Claim 27, wherein said processor is operable to process said P intermediate input values through an optimizer to provide optimized intermediate input values as said P modified intermediate values.

32 ~~31~~. The mapping network of Claim 30 ~~30~~, wherein said optimizer is a steady state optimizer.

33 ~~32~~. The mapping network of Claim 31 ~~31~~, wherein said steady state optimizer comprises a neural network which is non-linear.

34 ~~33~~. The mapping network of Claim 27 ~~27~~, wherein said P intermediate inputs constitute a spatial relationship for a parameter of the plant wherein said first relationship defines the spatial relationship of said P intermediate inputs to said N select received inputs.

35 ~~34~~. The mapping network of Claim 27 ~~27~~ and further comprising a pre-processor for processing select ones of said N select ones of said received inputs through a predetermined pre-process algorithm.

36 ~~35~~. The mapping network of Claim 35 ~~34~~, wherein said pre-processor comprises:

a constraining device for defining constraints for select ones of said N select ones of said received inputs; and

said constraining device for limiting said predetermined modification algorithms such that processing of said P intermediate values by said processor will not result in the corresponding ones of said N modified inputs from exceeding said defined constraints.

37 ~~36~~. An optimization network for optimizing the operation of a boiler, comprising:

an input network for measuring the inputs and the outputs of the boiler;

an input mapper for mapping a defined plurality of said measured inputs through a predetermined relationship that defines a desired operating parameter of the plant based upon said defined plurality of said measured inputs to intermediate inputs numbering less than said defined plurality of said measured inputs;

a processor for processing said intermediate inputs and said inputs not in said defined plurality of said measured inputs through an optimizer to provide optimized intermediate input values for said intermediate inputs and optimized inputs not in said defined plurality of said measured inputs optimized in accordance with a predetermined optimization algorithm;

an output mapper for mapping said optimized intermediate input values through an inverse of said predetermined relationship to provide an optimized defined plurality of inputs corresponding to the defined plurality of said measured inputs; and

a controller for applying said optimized defined plurality of inputs and said optimized inputs not in said defined plurality of said measured inputs to the boiler.

38 ~~37~~. The optimization network of Claim 37 ~~36~~, wherein the boiler has a furnace with a plurality of inlet ports for providing fuel to a desired location in said furnace and arranged at different elevations, such that fuel can selectively be delivered at various of the elevations at different feed rates, and wherein said predetermined relationship comprises:

$$Fe = \frac{(K_1)(R_1) + (K_2)(R_2) + (K_3)(K_4)\ldots\ldots + (K_n)(R_n)}{R_1 + R_2 + R_3\ldots\ldots + R_n}$$

where: Fe = Calculated Fuel Elevation

$K_1 \ldots K_n$ = Elevation Constant for elevation 1 to n (described hereinbelow)

$R_1 \ldots R_n$ = Coal Feed Rate for elevation 1 to n

such that fuel can be concentrated at a desired location in said furnace with a desired center of mass for said fuel concentration.

39 ~~38~~. The optimization network of Claim 37 ~~36~~, wherein the boiler has a furnace with a plurality of dampers for providing auxiliary air to said furnace with a geometric center defined therefor and arranged at different elevations, such that air can selectively be delivered at various of the elevations at different rates, and wherein said predetermined relationship comprises:

$$\text{Aux\_air\_center} = \frac{\left((\tfrac{1}{3})(\text{D3}) + (\text{D5}) + (1)(\text{D7})\right)}{\text{D3} + \text{D5} + \text{D7}}$$

wherein D3, D5 and D7 represent damper opening values for three dampers, each value for said damper representing a percent open value therefor, this relationship representing the center of mass for the auxiliary air based on said damper positions and an arbitrary furnace elevation scale wherein in damper D7 is set at said maximum elevation, damper D5 is set at ⅔ of the elevation, and damper D3 is set at ⅓ of the elevation.

70 ~~39~~. The method of Claim ~~36~~ 37, wherein the boiler has a furnace with a plurality of dampers for providing auxiliary air to said furnace from a windbox with a geometric center defined therefor and arranged at different elevations, such that air can selectively be delivered at various of the elevations at different rates, and wherein said predetermined relationship comprises:

$$\text{Aux\_air\_center} = \frac{a}{b}$$

where D3, D5 and D7 represent damper opening values for three dampers, each value for said damper representing a percent open value therefor, this relationship representing the flowated geometric center of for the auxiliary air and:

$$\begin{aligned} a = {} & (\tfrac{1}{3})(D3)(D3\_Area)(\sqrt{WB/FUR}) \\ & + (\tfrac{2}{3})(D5)(D5\_Area)(\sqrt{WB/FUR}) \\ & + (1)(D7)(D7\_Area)(\sqrt{WB/FUR}) \end{aligned}$$

$$\begin{aligned} b = {} & (D3)(D3\_Area)(\sqrt{WB/FUR}) \\ & + (D5)(D5\_Area)(\sqrt{WB/FUR}) \\ & + (D7)(D7\_Area)(\sqrt{WB/FUR}) \end{aligned}$$

D3 = % open of Damper 3

D5 = % open of Damper 5

D7 = % open of Damper 7

WB/FUR = Windbox to Furnace pressure - differential pressure between said windbox and the interior of said furnace.

12 ~~46~~. A optimization network for optimizing the operation of a plant having a plurality of manipulatable input variables (MVs) and at least one output, comprising;

a predictive network operable to receive select ones of the MVs on an input thereto and predict and output on an output new and updated values therefor as updated MV inputs to the plant in accordance with a predetermined prediction algorithm; and

a controller for inputting the updated MV inputs to the plant;

said predictive network having:

an input mapper for mapping N select ones of the MVs through a first relationship defining P intermediate MVs numbering less than N, wherein said first relationship defines the relationship between said N select MVs and said P intermediate MVs as a set of P intermediate values,

a processor for processing said P intermediate values and the non mapped ones of said MVs through a modifying process which modifies said P intermediate values and said non mapped ones of said MVs in accordance with a predetermined modification algorithm to provide P modified intermediate MVs with corresponding P modified intermediate values and non mapped modified MVs for said non mapped ones of said MVs, and

an output mapper for mapping said P modified intermediate MVs and associated P modified intermediate values through the inverse of said first relationship to provide N modified select MVs at the output of the second mapper corresponding to said N select MVs,

wherein said P modified intermediate MVs and said non mapped modified MVs comprise said updated MV inputs.

~~41~~ 42. The optimization network of Claim ~~40~~ 41, and further comprising a post processor for processing select ones of said N modified MVs on said N modified MVs with a predetermined process algorithm.

~~42~~ 43. The optimization network of Claim ~~41~~ 42, wherein said predetermined process algorithm is unique to said associated one of said N modified MVs.

~~43~~ 44. The optimization network of Claim ~~41~~ 42, wherein said predetermined process algorithm provides constraining limits on the range of associated ones of said N modified select inputs.

~~44~~ 45. The method of Claim ~~40~~ 41, wherein said processor is operable to process said P intermediate input values and said non mapped MVs through an optimizer to provide optimized intermediate MVs as said P modified intermediate values and optimized non mapped Mvs for said non mapped MVs.

~~45~~ 46. The optimization network of Claim ~~44~~ 45, wherein said optimizer is a steady state optimizer.

~~46~~ 47. The optimization network of Claim ~~15~~ 19, wherein said steady state optimizer comprises a neural network which is non-linear.

~~47~~ 48. The meth optimization network of Claim ~~40~~ 41, wherein said P intermediate MVs constitute a spatial relationship for a parameter of the plant wherein said first relationship defines the spatial relationship of said P intermediate MVs to said N select MVs.

~~48~~ 49. The optimization network of Claim ~~40~~ 41 and further comprising a pre-processor for processing select ones of said N select ones of said MVs through a predetermined pre-process algorithm.

~~49~~ 50. The optimization network of Claim ~~48~~ 49, wherein the step of pre-processing comprises:

defining constraints for select ones of said N select ones of said MVs; and

limiting said predetermined modification algorithms such that processing of said P intermediate values will not result in the corresponding ones of said N modified MVs from exceeding said defined constraints.

~~50~~ 51. The optimization network of Claim ~~40~~ 41, wherein there are unmeasurable disturbances associated with the plant and said modifying process is based on a model of the plant, and further comprising an estimation network for determining an estimation of the unmeasurable disturbances and altering said modifying process based upon such estimation to account for said unmeasurable disturbances.

~~51~~ 52. The optimization network of Claim ~~50~~ 51, wherein said processor is operable to process said P intermediate input values and the non mapped MVs through a steady state optimizer to provide optimized intermediate MVs as said P modified intermediate values and optimized non mapped Mvs for said non mapped Mvs and said estimation network is operable to determine a bias value for said steady state optimizer and apply it to said steady state optimizer.